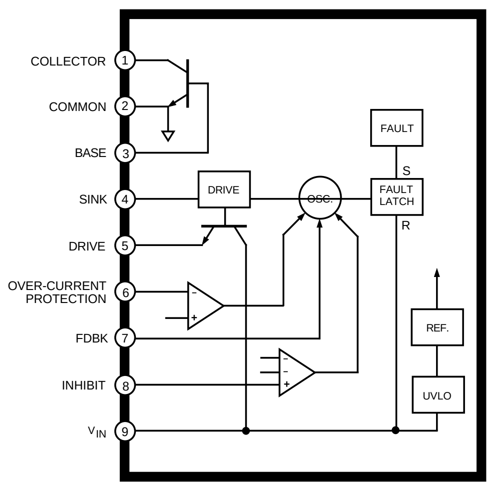
STR-S6707 THRU STR-S6709

Data Sheet
28113*

OFF-LINE SWITCHING REGULATORS – WITH BIPOLAR SWITCHING TRANSISTOR



Dwg. PK-001

ABSOLUTE MAXIMUM RATINGS

Supply Voltage, V_{IN} .... **15 V**
Output Voltage, V_{CEX} .... **850 V**
V_{EBO} .... **7 V**
Continuous Output Current,
I_C .... **See Table**
1 ms Single-Pulse Output Current,
I_{CM} .... **See Table**
Sink Current, I_S .... **See Table**
Drive Current, I_D .... **-700 mA**
Feedback Current, I_{FDBK} .... **20 mA**
Inhibit Voltage, V_{INH} .... **15 V**
Over-Current Protection Voltage Range,
V_{OCP} .... **±3.5 V**
Insulation Voltage, $V_{WM(RMS)}$ .... **2000 V**
Package Power Diss., P_D .... **See Graph**
Output Junction Temperature, T_J .. **+150°C**
Internal Frame Temperature, T_F ... **+125°C**
Operating Temperature Range,
T_A .... **-20°C to +125°C**
Storage Temperature Range,
T_{stg} .... **-40°C to +125°C**

The STR-S6707, STR-S6708, and STR-S6709 are specifically designed to meet the requirement for increased integration and reliability in off-line quasi-resonant flyback converters. These devices incorporate the primary control and proportional drive circuit with a third-generation high-voltage bipolar switching transistor.

Crucial system parameters such as maximum ON time and OFF time are fixed during manufacture. Local control circuit decoupling and layout are optimized within each device.

Cycle-by-cycle current limiting, under-voltage lock-out with hysteresis, over-voltage protection, and thermal shutdown protect these devices during all normal and overload conditions. Over-voltage protection and thermal shutdown are latched after a short delay. A versatile triple-level inhibit circuit includes the OFF time synchronization required to establish quasi-resonant operation. The inhibit function has also been expanded to initiate operation in stand-by mode in which the power supply delivers a small fraction of the steady-state output power. The dual requirements of dielectric isolation and low transient thermal impedance and steady-state thermal resistance are satisfied in an over-molded single-in-line power package.

Proven in substantial volumes, these devices and their fixed-frequency counterparts represent a significant advance in off-line SMPS reliability growth and integration.

FEATURES

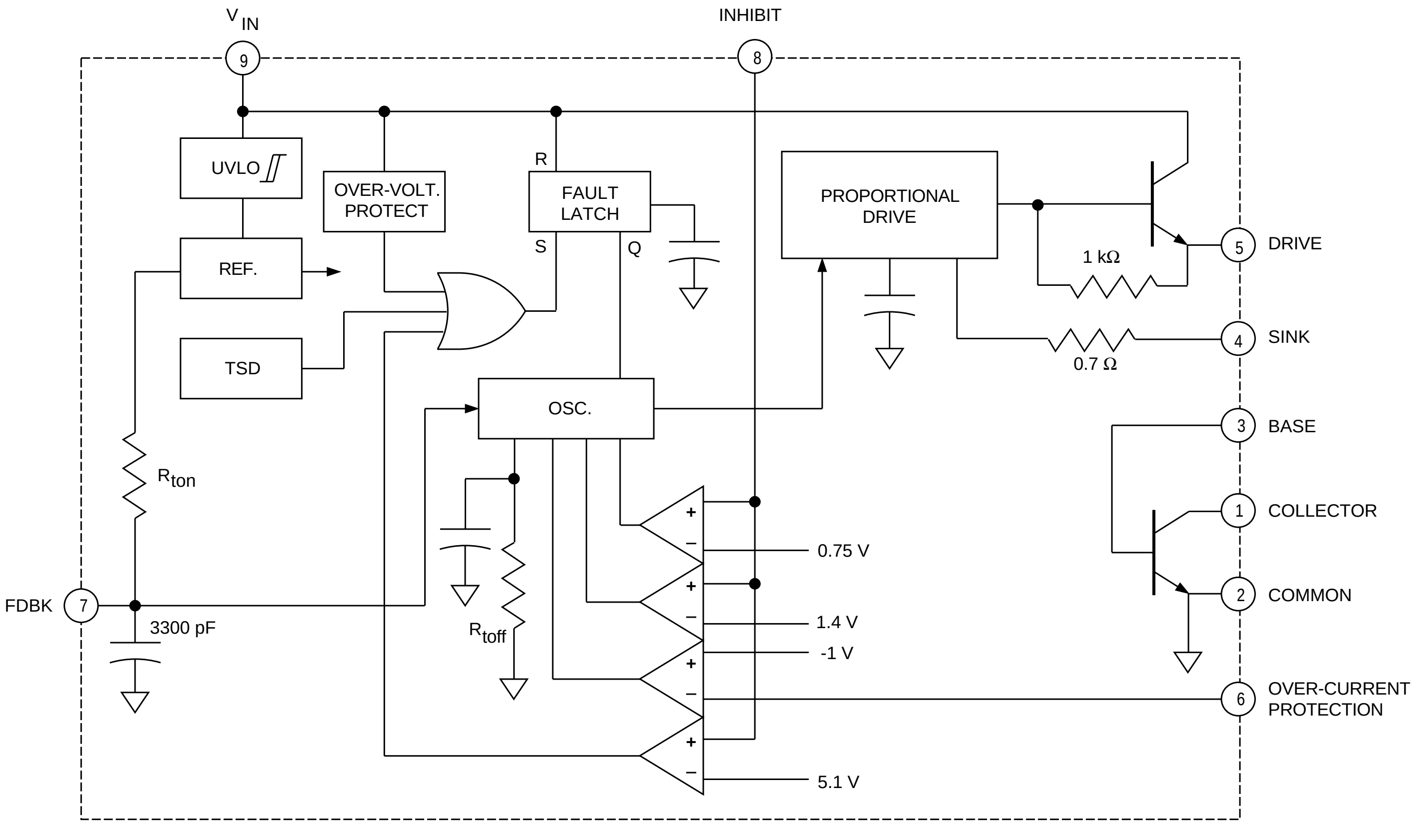
- Quasi-Resonant Operation for Low EMI and High Efficiency
- Output Power to 220 W
- Low-Power Output Standby Mode
- Pulse-by-Pulse Over-Current Protection
- Latched Over-Voltage and Thermal Protection
- Third-Generation Switching Transistor with Proportional Drive
- Maximum ON Time and Off Time Set During Manufacture
- Internal Under-Voltage Lockout with Hysteresis
- Over-Molded SIP with Integral Isolated Heat Spreader

Always order by complete part number:

Part Number	Max. Cont. Current, I_C	Peak Current, I_{CM}	Max. Sink Current, I_S
STR-S6707	**6 A**	**12 A**	**1.5 A**
STR-S6708	**7.5 A**	**15 A**	**1.5 A**
STR-S6709	**10 A**	**20 A**	**2 A**

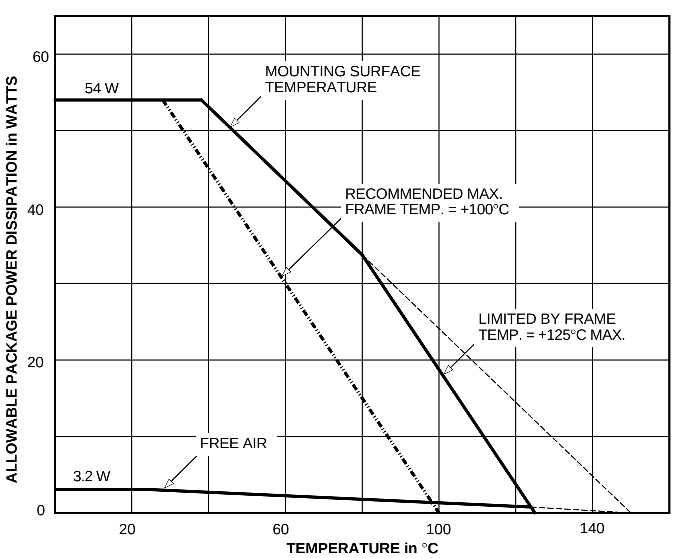
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STR-S6707 AND STR-S6708 FUNCTIONAL BLOCK DIAGRAM



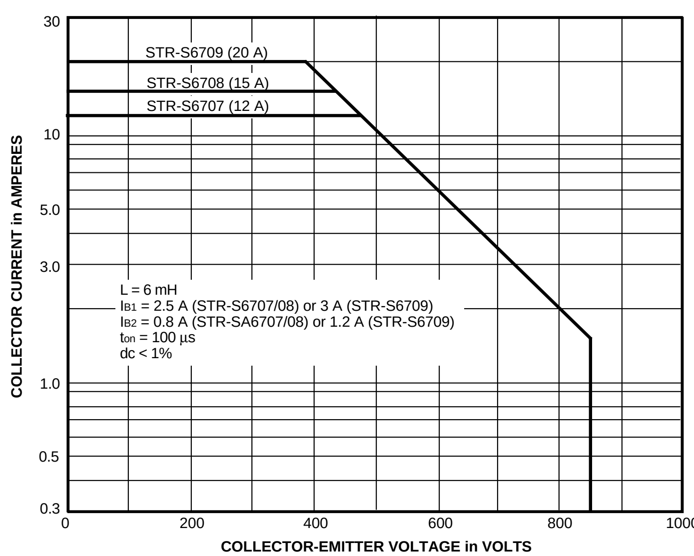
Dwg. FK-001

ALLOWABLE PACKAGE POWER DISSIPATION



Dwg. GK-003-2

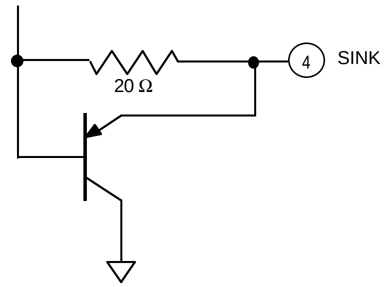
MAXIMUM SAFE OPERATING AREA



Dwg. GK-002

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STR-S6709
FUNCTIONAL BLOCK DIAGRAM
AS ABOVE
EXCEPT FOR SINK OUTPUT

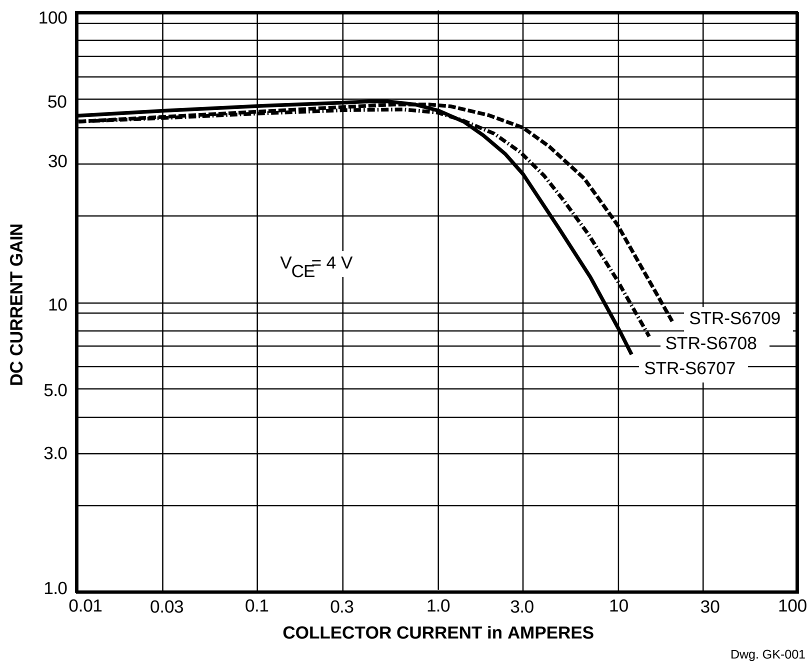


ELECTRICAL CHARACTERISTICS at T_A = +25°C, V_{IN} = 8.5 V, voltage measurements are referenced to Common (pin 2) (unless otherwise noted).

Characteristic	Symbol	Test Conditions	Limits Min.	Typ.	Max.	Units
On-State Voltage	V_{INT}	Turn-on, increasing V_{IN}	7.6	8.0	8.4	V
Under-Voltage Lockout	V_{INQ}	Turn-off, decreasing V_{IN}	4.6	4.9	5.2	V
Over-Voltage Threshold	$V_{OVP(th)}$		9.2	–	10.7	V
Output Leakage Current	I_{CEX}	V_{CE} = 850 V, V_{BE} = -1.5 V	–	–	100	µA
Output Saturation Voltage	$V_{CE(sat)}$	STR-S6707, I_C = 2 A, I_B = 400 mA	–	–	400	mV
		STR-S6708, I_C = 3 A, I_B = 600 mA	–	–	400	mV
		STR-S6709, I_C = 4 A, I_B = 800 mA	–	–	400	mV
	$V_{BE(sat)}$	STR-S6707, I_C = 2 A, I_B = 400 mA	–	–	1.5	V
		STR-S6708, I_C = 3 A, I_B = 600 mA	–	–	1.5	V
		STR-S6709, I_C = 4 A, I_B = 800 mA	–	–	1.5	V
DC Current Gain	h_{FE}	V_{CE} = 4 V, I_C = 1 A	29	–	61	–
Maximum ON Time	t_{on}		33	–	41	µs
Minimum OFF Time	t_{off}		45	–	55	µs
Over-Current Threshold	$V_{OCP(th)}$		-0.9	-1.0	-1.1	V
Feedback Threshold Volt.	$V_{FDBK(th)}$		–	650	–	mV
Inhibit Threshold Voltage	$V_{INH(th)}$	Oscillation stops	0.65	0.75	0.85	V
		Oscillation synchronized	–	1.4	2.0	V
		Oscillation stops (fault latch set)	3.2	5.1	5.6	V
Latch Holding Current	I_{INH}	V_{IN} reduced from 10.7 V to 4 V	–	–	500	µA
Latch Reset Voltage	V_O	$I_{IN} \leq$ 100 µA, V_{IN} reduced from 10.7 V	2.5	3.1	–	V
Supply Current	$I_{IN(ON)}$	Operating	15	–	29	mA
	$I_{IN(OFF)}$		–	–	200	µA
Insulation RMS Voltage	$V_{WM(RMS)}$	All terminals simultaneous reference metal plate against backside	2000	–	–	V
Thermal Shutdown	T_J		125	150	–	°C
Thermal Resistance	$R_{\theta JM}$	Output junction to mounting surface	–	2.0	–	°C/W

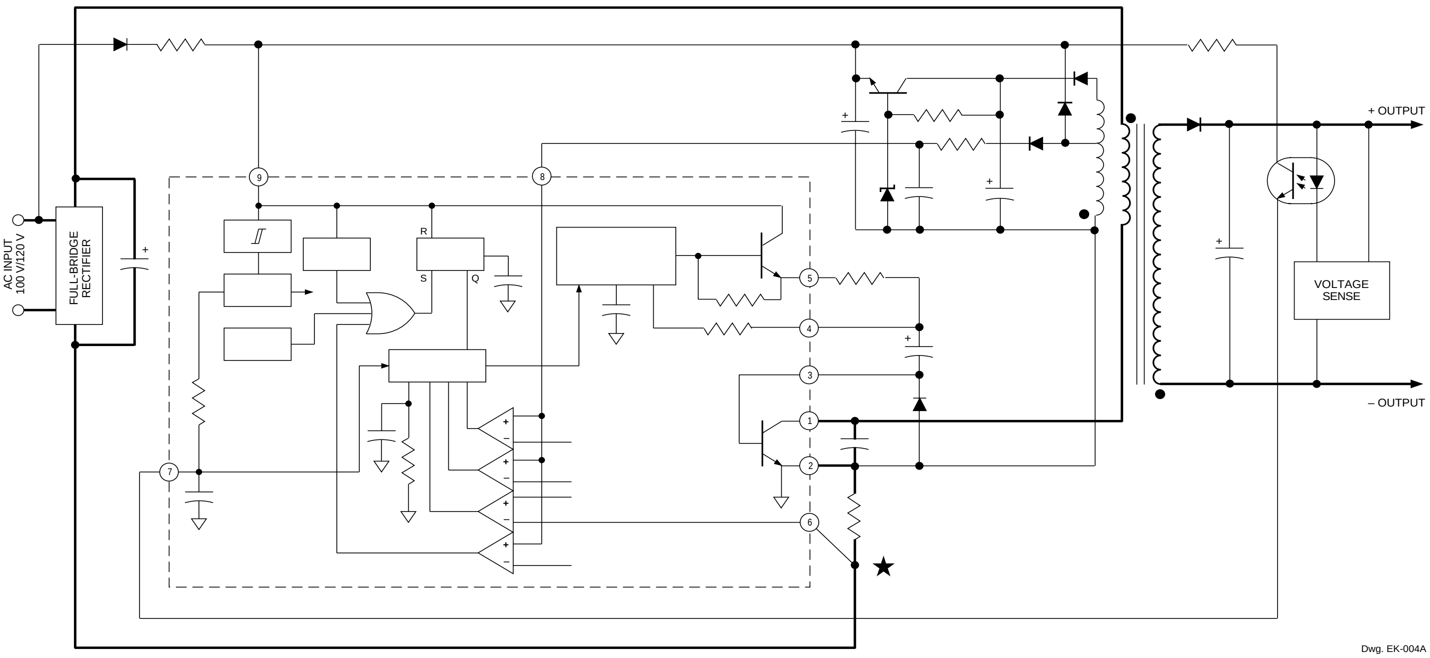
NOTES: Negative current is defined as coming out of (sourcing) the specified device terminal.
Typical Data is for design information only.

TYPICAL CHARACTERISTICS



TYPICAL QUASI-RESONANT FLYBACK CONVERTER

WARNING: lethal potentials are present. See text.



Dwg. EK-004A

APPLICATIONS INFORMATION

WARNING — These devices are designed to be operated at lethal voltages and energy levels. Circuit designs that embody these components must conform with applicable safety requirements. Precautions must be taken to prevent accidental contact with power-line potentials. Do not connect grounded test equipment.

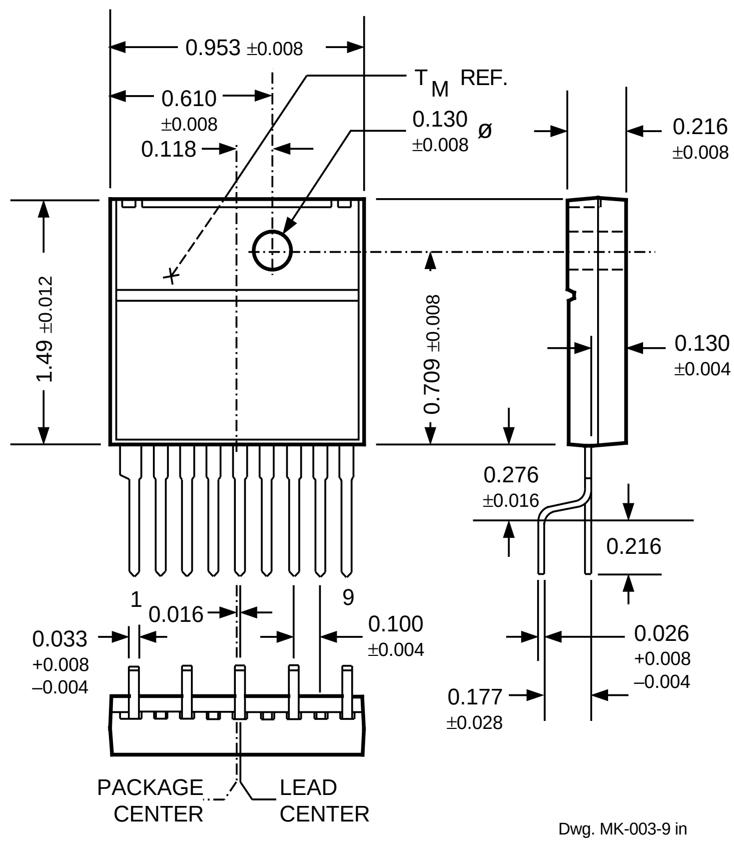
The use of an isolation transformer is recommended during circuit development and breadboarding.

Recommended mounting hardware torque:
4.34 – 5.79 lbf•ft (6 – 8 kg•cm or 0.588 – 0.784 Nm).

Recommended metal-oxide-filled, alkyl-degenerated oil base, silicone grease:
Dow Corning 340, or equivalent

Dimensions in Inches

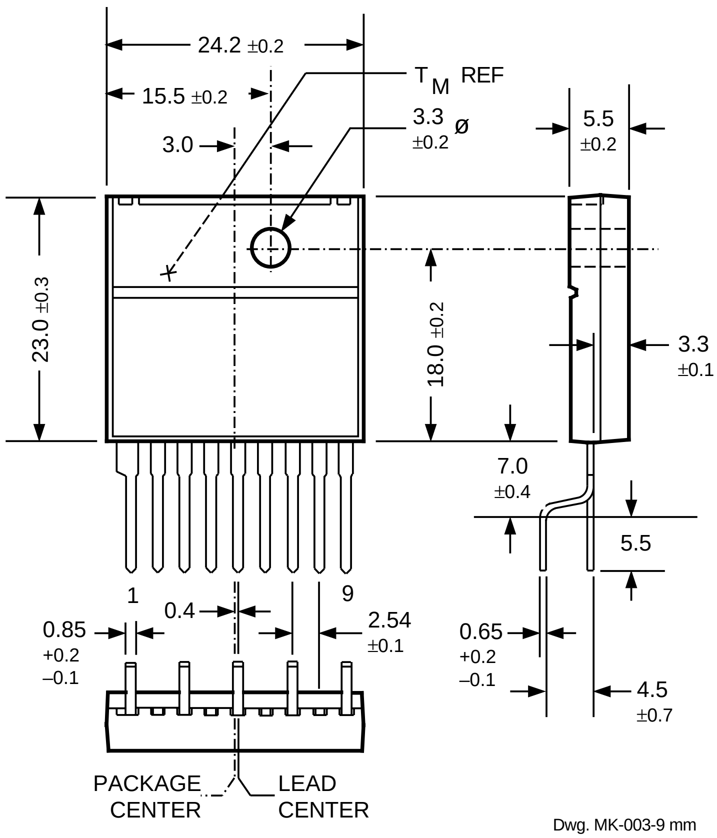
(Based on 1 mm = 0.03937")



NOTE: Exact body and lead configuration at vendor's option within limits shown.

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Dimensions in Millimeters



NOTE: Exact body and lead configuration at vendor's option within limits shown.

POWER CONVERSION/POWER MANAGEMENT

SWITCHING REGULATOR PMCMs

Part Number*	Application	AC In	Max P_O	Power Switch		
5703	Quasi-Resonant Flyback Converter	110/120 V	140 W	500 V	6 A	Bipolar
5707	Quasi-Resonant Flyback Convertter	85-265 V	90 W	850 V	6 A	Bipolar
		220/240V	140 W			
5708	Quasi-Resonant Flyback Converter	85-265 V	120 W	850 V	7.5 A	Bipolar
		220/240 V	180 W			
6511	Quasi-Resonant Flyback Converter	110/120 V	180 W	450 V	11 A	MOSFET
6525	Quasi-Resonant Flyback Converter	85-265 V	120 W	600 V	6 A	MOSFET
6529	Quasi-Resonant Flyback Converter	220/240 V	180 W	800 V	5.4 A	MOSFET
6703	Quasi-Resonant Flyback Converter	110/120V	140 W	500 V	6 A	Bipolar
6704	Quasi-Resonant Flyback Converter	110/120 V	100 W	500 V	5 A	Bipolar
6707	Quasi-Resonant Flyback converter	85-265 V	90 W	850 V	6 A	Bipolar
		220/240 V	140 W			
6708	Quasi-Resonant Flyback Converter	85-265 V	120 W	850 V	7.5 A	Bipolar
		220/240 V	180 W			
6709	Quasi-Resonant Flyback Converter	85-265 V	160 W	850 W	10 A	Bipolar
		220/240 V	220 W			

* Complete part number includes additional characters to indicate operating temperature range and package style.

LINEAR REGULATOR ICs

Part Number*	V_O	Max DC In	Max Dropout	Max I_O	Package
8181	5.0 V	10 V	300 mV @ 500 mA	1.0 A	16-lead SOIC
8183	3.0 V	10 V	300 mV @ 125 mA	250 mA	6-lead SOT-89
8184	3.0 V	10 V	300 mV @ 125 mA	250 mA	SOT-89
8186	3.3 V	10 V	300 mV @ 125 mA	250 mA	6-lead SOT-89
8187	3.3 V	10 V	300 mV @ 125 mA	250 mA	SOT-89

* Complete part number includes additional characters to indicate operating temperature range and package style.

Also — 83145 and 84145 Latched, Universal Input-Voltage Switches.

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